MAT 1505-05/08 015 Quiz 10 Homework Assignment

① $f(x) = 3x^4 - 4x^3 - 12x^2 + 5$ Taylor expand about $x = 1$ and then about $x = 2$.
Check with MAPLE and print out your verification.

② Stewart 11.R.58: The force due to gravity on an object with mass m at a height h above the
surface of the Earth is $\qquad F = \dfrac{mgR^2}{(R+h)^2}$, $\qquad$ where R is the radius of Earth
and g is the acceleration due to gravity.

then back substitute
$x = h/R$.

a) Express F as a series in powers of h/R.

b) Observe that if we approximate F by the first term in the series, we get the
expression $F \approx mg$ that is usually used when h is much smaller than R. Use the
Alternating Series Estimation Theorem to estimate the range of values of h for which
the approximation $F \approx mg$ is accurate to within 1%. (Use $R = 6400$ km).

Hint: Use $\dfrac{1}{(R+h)^2} = R^{-2}(1+x)^{-2}$ with $x = h/R$. First Taylor expand $f(x) = (1+x)^{-2}$ and easily get formula for nth term